WHAT IS CLAIMED IS:

[c01] A curable epoxy formulation comprising at least one epoxy monomer, at least one organofunctionalized colloidal silica, at least one alkyl onium cure catalyst, and optional reagents.

[c02] The curable epoxy formulation in accordance with claim 1, wherein the organofunctional colloidal silica comprises up to about 80 weight % of silicon dioxide, based on the total weight of the total curable epoxy formulation.

[c03] The curable epoxy formulation in accordance with claim 1, wherein the colloidal silica is functionalized with an organoalkoxysilane.

[c04] The curable epoxy formulation in accordance with claim 3, wherein the organoalkoxysilane comprises phenyltrimethoxysilane.

[c05] The curable epoxy formulation in accordance with claim 3, wherein the colloidal silica is further treated with an acid, basic, or ion exchange resin.

[c06] The curable epoxy formulation in accordance with claim 5, wherein the colloidal silica is treated with a basic resin.

[c07] The curable epoxy formulation in accordance with claim 6, wherein the basic resin comprises crosslinked polyvinylpyridine.

[c08] The curable epoxy formulation in accordance with claim 1, further comprising at least one organic diluant.

[c09] The curable epoxy formulation in accordance with claim 8, wherein the organic diluant comprises 3-ethyl-3-hydroxymethyl-oxetane.

[c10] The curable epoxy formulation in accordance with claim 1, wherein the epoxy monomer comprises a cycloaliphatic epoxy monomer, an aliphatic epoxy monomer, an aromatic epoxy monomer, a silicone epoxy monomer, or combinations thereof.

[c11] The curable epoxy formulation in accordance with claim 1, wherein the alkyl onium cure catalyst comprises an alkyl sulfonium cure catalyst.

[c12] The curable epoxy formulation in accordance with claim 11, wherein the alkyl sulfonium cure catalyst comprises 3-methyl-2-butenyltetramethylene sulfonium hexafluoroantimonate, substituted aryl-dialkyl sulfonium hexafluoroantimonate, or combinations thereof.

[c13] The curable epoxy formulation in accordance with claim 12, wherein the alkyl sulfonium cure catalyst comprises 3-methyl-2-butenyltetramethylene sulfonium hexafluoroantimonate.

[c14] The curable epoxy formulation in accordance with claim 1, wherein the cured formulation provides a coefficient of thermal expansion of below about 70 ppm/°C.

[c15] The curable epoxy formulation in accordance with claim 1, wherein the optional reagents comprise anti-oxidants, mold releasing additives, plasticizing additives, or combinations thereof.

[c16] The curable epoxy formulation in accordance with claim 1, wherein the cured formulation provides an optical transmission of at least about 80% at 400 nanometers.

[c17] A curable epoxy formulation comprising at least one epoxy monomer, phenyltrimethoxysilane functionalized colloidal silica, and a cure catalyst comprising 3-methyl-2-butenyltetramethylene sulfonium hexafluoroantimonate.

[c18] A solid state device comprising an encapsulant,

wherein the encapsulant comprises at least one epoxy monomer, at least one organofunctionalized colloidal silica, at least one alkyl onium cure catalyst, and optional reagents.

[c19] The solid state device in accordance with claim 18, wherein the organofunctional colloidal silica comprises up to about 80 weight % of silicon dioxide, based on the total weight of the total curable epoxy formulation.

[c20] The solid state device in accordance with claim 18, wherein the colloidal silica is functionalized with an organoalkoxysilane.

[c21] The solid state device in accordance with claim 20, wherein the organoalkoxysilane comprises phenyltrimethoxysilane.

[c22] The solid state device in accordance with claim 20, wherein the colloidal silica is further treated with an acid, basic, or ion exchange resin.

[c23] The solid state device in accordance with claim 22, wherein the colloidal silica is further treated with a basic resin.

[c24] The solid state device in accordance with claim 22, wherein the basic comprises crosslinked polyvinylpyridine.

[c25] The solid state device in accordance with claim 18, wherein the encapsulant further comprises at least one organic diluant.

[c26] The solid state device in accordance with claim 25, wherein the organic diluant comprises 3-ethyl-3-hydroxymethyl-oxetane.

[c27] The solid state device in accordance with claim 18, wherein the epoxy monomer comprises a cycloaliphatic epoxy monomer, an aliphatic epoxy monomer, an aromatic epoxy monomer, a silicone epoxy monomer, or combinations thereof.

[c28] The solid state device in accordance with claim 18, wherein the alkyl onium cure catalyst comprises alkyl sulfonium cure catalyst.

[c29] The solid state device in accordance with claim 28, wherein the alkyl sulfonium cure catalyst comprise 3-methyl-2-butenyltetramethylene sulfonium hexafluoroantimonate, substituted aryl-dialkyl sulfonium hexafluoroantimonate, or combinations thereof

[c30] The solid state device in accordance with claim 29, wherein the alkyl onium cure catalyst comprises 3-methyl-2-butenyltetramethylene sulfonium hexafluoroantimonate.

[c31] The solid state device in accordance with claim 18, wherein the cured encapsulant provides a coefficient of thermal expansion of below about 70 ppm/°C.

[c32] The solid state device in accordance with claim 18, wherein the optional reagent comprises anti-oxidants, mold releasing additives, plasticizing additives, or combinations thereof.

[c33] The solid state device in accordance with claim 18, wherein the encapsulant provides an optical transmission of at least about 80% at 400 nanometers.

[c34] A light emitting diode comprising an encapsulant,

wherein the encapsulant comprises at least one epoxy monomer, phenyltrimethoxysilane functionalized colloidal silica, and a cure catalyst comprising 3-methyl-2-butenyltetramethylene sulfonium hexafluoroantimonate